

## CLAIMS

What is claimed is:

1) Portable, non-invasive systems for blood analyte measurement integrated with a common article wearable about the body comprising:

- 5 a rigid case operable for containing;  
a processing unit in communication with;  
an optical source; and  
an acoustic detector,

10 said rigid case having a top side and a bottom side, the bottom side suitable for supporting said acoustic detector and said optical source whereby they may be coupled to human tissue.

2) Apparatus of claim 1, said rigid case forming an enclosed space of between one and ten cubic centimeters such that the article may be easily worn about the  
15 body.

3) Apparatus of claim 2, said elements being integrated together with timekeeping facility to form a wrist watch type article suitable for wear at the wrist.

20 4) Apparatus of claim 3, said elements are arranged to effect a photoacoustic effect measurement of blood analytes via optical stimulation of pressure waves in an elastic tissue medium.

5) Apparatus of claim 3, said optical source is comprised of at least one  
25 quantum cascade semiconductor laser operable for producing beams of light in a Mid-IR spectra between 2 – 200 microns.

6) Apparatus of claim 5, said beam of light is comprised of a plurality of center wavelengths at least one tuned to natural resonances of a glucose molecule.

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7) Apparatus of claim 3, said acoustic detector is characterized as an audio microphone.

8) Apparatus of claim 7, said acoustic detector is at least one PZT crystal operable for producing an electrical output in response to incident pressure.

9) Apparatus of claim 8, said acoustic detector includes an array of discrete elements tuned to a particular region.

10) Apparatus of claim 3, said rigid case bottom side supports an optical and acoustic coupling to tissue and may be fastened to the human wrist whereby the bottom side makes intimate contact with tissue at the top of the wearer's wrist.

11) Apparatus of claim 10, back of watch case provides optical coupling to tissue whereby light penetrates the tissue up to about 100 microns in depth.

12) Apparatus of claim 10, back of watch case provides acoustic coupling to tissue whereby acoustic energy originating in tissue below the skin surface is coupled into the case via said acoustic detector.

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13) Apparatus of claim 10, said case further comprises a user interface operable for presenting indicia at a display means.

14) Apparatus of claim 10, said case further comprises a data output port whereby information contained in a memory may be electronically passed to external systems including a computer.

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